

# Office Action Summary

**Application No.**

10/733,226

**Applicant(s)**

HIATT ET AL.

**Examiner**

Colleen A. Matthews

**Art Unit**

2811

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 13 August 2009.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 28-37, 39-47 and 49-52 is/are pending in the application.
- 4a) Of the above claim(s) 37 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 28-36, 39-47 and 49-52 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-946)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_
- 4) ☒ Interview Summary (PTO-413)  
Paper No(s)/Mail Date 2011/216
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_

### **DETAILED ACTION**

The non-final office action mailed 09/17/2010 is vacated.

#### ***Drawings***

The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, "second microelectronic device," "second die," "second integrated circuit," and "second bond pad" (Claim 39 and 44 for example) as well as "stacked-die arrangement" (Claim 40, for example), "solder ball" (Claim 41, for example), and "redistribution layer" (Claim 43, for example) must be shown or the feature(s) canceled from the claim(s). It is noted some of these features are shown in Figure 1, however Figure 1 depicts the prior art, not the current invention.

No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering

of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

**Claim 50 is rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 50 recites the limitation "the insulative material" in line 3. There is insufficient antecedent basis for this limitation in the claim.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

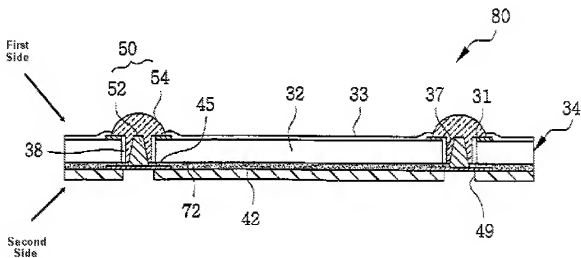
A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

**Claims 28-30, 33, 36, 39-45 and 49-52 are rejected under 35 U.S.C. 102(e)** as being anticipated by U.S. Pat. No. 6,982,487 to Kim et al. (Kim).

FIG. 4



***Kim's Figure 4, Annotated***

**Re claim 28:** Kim closes a packaged microelectronic device (Figures 4 and 17, for example) comprising:

a die (30) having a first side (see First Side, *Kim's Figure 4, Annotated*) and a second side (see Second Side, *Kim's Figure 4, Annotated*) opposite to the first side, the die further having

an integrated circuit (34) positioned between the first and second sides;

a bond-pad (31) positioned on the first side of the die and electrically coupled to the integrated circuit;

a passage (37) extending completely through the die and aligned with and extending through the bond-pad (also see Fig 14);

a first conductive material (54) deposited in a first portion of the passage adjacent to the first side of the die to form a conductive plug electrically connected to the bond-pad; and

a second conductive material (52) deposited in a second portion of the passage in contact with the conductive plug to at least generally fill the passage from the conductive plug to the second side of the die.

Regarding the limitations such as "deposited" and "to at least generally fill the passage" it is noted that these limitations refer to a process of manufacturing, however the claim is directed to a product. Accordingly the claim limitations will only be considered in accordance with the resulting product that is made. *"Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process."* In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.

**Re claim 33:** Klm discloses a microfeature workpiece (Figures 4 and 17, for example) having a first side and a second side opposite to the first side, the microfeature workpiece comprising:

- at least one die (30);

- a bond-pad (31) formed on the first side of the microfeature workpiece;

- a passage (37) extending completely through the bond-pad and the die from the first side of the microfeature workpiece to the second side of the microfeature workpiece;

- a first conductive material (54) deposited in a first portion of the passage adjacent to the first side of the microfeature workpiece to form a conductive plug in contact with the bond-pad; and

- a second conductive material (52) deposited in a second portion of the passage in contact with the conductive plug to at least generally fill the passage from the conductive plug to the second side of the microfeature workpiece, wherein the first conductive material (solder, col 4 lines 38-39) is different than the second conductive material (metal bump, for example copper, col 4 line 36 and col 7 line25-33).

Regarding the limitations such as “deposited” and “to at least generally fill the passage” it is noted that these limitations refer to a process of manufacturing, however the claim is directed to a product. Accordingly the claim limitations will only be considered in accordance with the resulting product that is made. *“Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not*

*depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.*

**Re claim 39:** Kim discloses a microelectronic device set comprising:

a first microelectronic device (Fig 4) having:

a first die (30) with a first integrated circuit (34) and a first bond-pad (37) electrically coupled to the first integrated circuit, the first die further including a passage (37) extending completely through the first die and the first bond-pad (see Fig 14); and

a conductive interconnect (50) deposited in the passage, the conductive interconnect including a first conductive material (54) deposited in a first portion of the passage to form a conductive plug having a boundary in the passage, and a second conductive material (52) deposited in a second portion of the passage in contact with the boundary of the conductive plug to at least generally fill the passage; and

at least a second microelectronic device having a second die (30) with a second integrated circuit (34) and a second bond-pad (31) electrically coupled to the second integrated circuit, wherein the second bond-pad is electrically coupled to the conductive interconnect of the first microelectronic device (see Fig 17).

Regarding the limitations such as "deposited" and "to at least generally fill the passage" it is noted that these limitations refer to a process of manufacturing, however the claim is directed to a product. Accordingly the claim limitations will only be considered in accordance with the resulting product that is made. *"Even though product-*

*by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process." In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.*

**Re claim 44:** Kim discloses a microelectronic device set (Figures 4 and 17, for example) comprising:

- a first microelectronic device (34) having:

- a first die (30) with a first integrated circuit (34) and a first bond-pad (31) electrically coupled to the first integrated circuit, the first die further including a passage (37) aligned with and extending through the first bond-pad (see Fig 14); and

- a conductive interconnect (50) deposited in the passage, the conductive interconnect including a first conductive material (54) deposited in a first portion of the passage to form a conductive plug in contact with the bond-pad (see Fig 14), and a second conductive material (52) deposited in a second portion of the passage in contact with the conductive plug to at least generally fill the passage; and

- at least a second microelectronic device having a second die (see Fig 17) with a second integrated circuit and a second bond-pad (31) electrically coupled to the second integrated circuit, wherein the second bond-pad is electrically coupled to the first bond-pad of the first microelectronic device (see Fig 17).



Regarding the limitations such as "deposited" and "to at least generally fill the passage" it is noted that these limitations refer to a process of manufacturing, however the claim is directed to a product. Accordingly the claim limitations will only be considered in accordance with the resulting product that is made. *"Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process."* In re Thorpe, 777 F.2d 695, 698, 227 USPQ 964, 966 (Fed. Cir. 1985). See MPEP 2113.

**Re claims 29 and 36:** Kim discloses packaged microelectronic device of claims 28 and 33 as above. Kim further teaches an insulative layer (38) deposited in the passage between the die and the first and second conductive materials (col 4 lines 31-33).

**Re claims 30 and 45:** Kim discloses packaged microelectronic device of claim 39 and 44 as above. Kim further teaches an insulative layer (38) deposited in the passage between the first die and the first and second conductive materials (col 4 lines 31-33).

**Re claim 40:** Kim discloses the microelectronic device set of claim 39 wherein the first microelectronic device is attached to the second microelectronic device in a stacked-die arrangement (see Fig 17).

**Re claim 41:** Kim discloses the microelectronic device set of claim 39, further comprising a solder ball (54) disposed between the conductive interconnect (50) of the first microelectronic device and the second bond-pad (31) of the second microelectronic device to electrically couple the first bond-pad to the second bond-pad (see Fig 17).

**Re claim 42:** Kim discloses the microelectronic device set of claim 39 wherein the passage (37) is a first passage. Kim further teaches wherein the second microelectronic device further includes a second passage (37) extending through the second die (30) and the second bond-pad (31), and wherein the second passage is completely filled with a third conductive material (50).

**Re claim 43:** Kim discloses the microelectronic device set of claim 39 wherein a first microelectronic device (Fig 4) further includes a redistribution layer (42) formed on the first die (30), the redistribution layer including a conductive line (45) having a first end portion attached (electrically attached) to the first bond-pad and a second end portion positioned outward of the first end portion, wherein the second end portion is configured to receive electrical signals and transmit the signals to at least the first integrated circuit of the first die and the second integrated circuit of the second die (PCB, see Fig 17)

**Re claims 49-52:** Kim discloses the packaged microelectronic device of claims 28, 33, 39 and 44 further comprising an insulative layer (38/72) deposited in the passage (37), wherein the second conductive material (52) contacts the conductive plug (54) and the insulative layer.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**Claims 31, 34 and 46 are rejected under 35 U.S.C. 103(a)** as being unpatentable over Kim in view of U.S. Pub. No. 2004/0087441 to Hirakata et al. (Hirakata)

**Regarding claims 31, 34 and 46**, Kim discloses the device of claims 28, 33 and 44 as above including the first conductive material (54) in contact with an exposed surface of the bond-pad (31). Kim fails to disclose wherein the first conductive material includes an electronic ink. Hirakata teaches a first conductive material (conductive paste; paragraph 102) includes an electronic ink (ink jetting; paragraph 102) in contact with an exposed surface of the bond-pad. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form the first conductive material including electronic ink as taught by Hirakata because with electronic printing processes the plug only needs to be formed in the desired area therefore wasted material is reduced.

**Claims 32, 35 and 47 are rejected under 35 U.S.C. 103(a)** as being unpatentable over U.S. Pat. No. 6,459,150 to Wu et al. (Wu) in view of U.S. Pub. No.

2004/0087441 to Bock et al. (Bock) or or U.S. Pat. No. 6,459,150 to Wu et al. (Wu) in view of U.S. Pat. No. 6,809,421 to Hayasaka et al. (Hayasaka) in view of U.S. Pub. No. 2004/0087441 to Bock et al. (Bock).

**Regarding claims 32, 35 and 47**, Kim discloses the device of claims 28, 33 and 44 as above including the first conductive material (54) in contact with an exposed surface of the bond-pad (31). Kim fails to disclose wherein the first conductive material includes a nano-particle deposition. Bock teaches using a nano-particle process to deposit a conductive material (abstract lines 15-20). It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Kim to have the first conductive material includes a nano-particle deposition as in Bock in order to deposit fine features.

### ***Response to Arguments***

Applicant's arguments with respect to claims 28-36, 39-47 and 49-52 filed 06/02/2010 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Colleen A. Matthews whose telephone number is (571)272-1667. The examiner can normally be reached on Monday - Friday 8AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Lynne Gurley can be reached on 571-272-1670. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Colleen A Matthews/  
Examiner, Art Unit 2811